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**OPEN DRAIN INPUT/OUTPUT STRUCTURE AND MANUFACTURING  
METHOD THEREOF IN SEMICONDUCTOR DEVICE**

**ABSTRACT**

5 An improved pull-up transistor is provided for use as an open drain input/output structure. The transistor includes a source and a drain that define a channel between them. An impurity implantation region in the channel does not reach both the source and the drain. The impurity can reach only the source, only the drain, or none of them. As such, it presents a discontinuity, which serves as a p-type channel. The transistor therefore can act as an  
10 enhancement transistor used for pull-up. The invention can be implemented with a mask ROM embedded MCU, or an EPROM embedded MCU.

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